

### REMARKS

Claims 93-110 are pending in the present application. Applicants thank the Office for indicating that the subject matter of Claims 97 and 98 is allowable if rewritten in independent form.

The Office rejected Claims 93-96 and 99-110 over Worrel (U.S. 3,948,619) in combination with Cherpeck (U.S. 5,300,701) and Baxter (U.S. 6,562,913). The Office cites to Worrel as evidence that it would be obvious to use a polyisobutene molecule to form a Mannich adduct.

Present independent Claim 93 recites a step of “alkylating a phenol with a highly reactive polyisobutene ...”. The alkylating of the presently claimed invention is carried out on a polyisobutene, not a polybutene. At best, Worrel describes an “olefin reactant” that is made by polymerizing butene (see column 5, lines 24-36 of Worrel). Nowhere in the Worrel patent is a polyisobutene material described. In fact, the Office even admits that Worrel “differs from the claims in that he does not specifically teach that the alkyl group is a highly reactive PIB ...” [polyisobutene] (see the last paragraph on page 3 of the August 19 Office Action).

The Office attempts to remedy this defect of Worrel by citing to Cherpeck and/or Baxter. Applicants submit that Cherpeck is likewise deficient with respect to the Office’s assertion of obviousness. Like Worrel, Cherpeck does not disclose or suggest all of the present claim limitations. At best Cherpeck discloses a polyisobutene substituted phenolic compound, not a Mannich adduct thereof. This disclosure, however, is insufficient to render the presently-claimed invention obvious because the olefin reactant of Cherpeck is not the Mannich adduct recited in the present claims.

Baxter may disclose or suggest a process for making a highly reactive polyisobutene but is silent with respect to any process for using the thus-obtained polyisobutene to alkylate a phenol and use the thus-alkylated phenol to form a Mannich adduct.

While the art of record, e.g., Cherpeck and/or Baxter, may disclose that polyisobutenes were known to those of skill in the art at the time the present application was filed, the cited art fails to provide any motivation for one of skill in the art to modify Worrel to arrive at the presently claimed invention. First, the cited art provides no reason why one of skill in the art would believe that a polyisobutene such as that disclosed or suggested in any of Cherpeck and/or Baxter would in fact be an equivalent substitute for any polybutene disclosed in Worrel. A polyisobutene has a structure that is substantially different than a generic polybutene. Polyisobutene includes two methyl ( $-\text{CH}_3$ ) groups which are pendent to a polymer chain. In contrast, a polybutene contains a single pendent ethyl ( $-\text{CH}_2\text{CH}_3$ ) substituent. Nowhere in the art of record is there any evidence proving that a polyisobutene and a polybutene are readily exchangeable and/or have equivalent physical and/or chemical properties.

Applicants submit that the Office's assertion that it would be obvious to use any polyisobutene disclosed or suggested in Cherpeck and/or Baxter in the process of Worrel or as a substitute for the Worrel polybutene is not supportable and the rejection should be withdrawn.

The differences in the alkyl substituent of Worrel and that of the present claims extends likewise to the relative molecular weights and amounts of vinylidene bonds present in the polybutene of Worrel in comparison to the polyisobutene of the present claims. It is an express requirement of present Claim 1 that the highly reactive polyisobutene has a vinylidene double bond content of "more than 70 mol%" and a molecular weight of "less than 900". The highly reactive polyisobutene of the present claims also has a polydispersity

requirement. When considered as a whole, Worrel is not suggestive of such a particular polyisobutene. In fact, Worrel discloses that the polybutene most preferred for the Worrel process is one having a molecular weight of 900-1,100 (see column 5, line 34 of Worrel), i.e., not encompassed by the “less than 900” molecular weight of the polyisobutene of the present claims.

The Worrel patent further does not disclose with sufficient specificity the other reactants recited in the present claims. For example, present Claim 93 recites an amine of formula  $\text{NHR}^4\text{R}^5$  where both  $\text{R}^4$  and  $\text{R}^5$  are  $\text{C}_1\text{-C}_{20}$  alkyl radicals. At best, Worrel discloses generic amines but nowhere discloses that any dialkyl amine (e.g., an amine of formula  $\text{-NR}^1\text{R}^2$ ) is preferred or provides any advantages. To the contrary, Worrel describes diamines (e.g., an amine having at least two N atoms). The amine described in the present claims is a dialkyl monoamine which is distinct and separate from the diamine of Worrel.

Applicants draw the Office’s attention to the examples in co-pending application 10/089,064. The examples in co-pending ‘064 describe the effect obtained when a dialkyl monoamine (e.g., a secondary monoamine) is used in certain fuel formulations. Pages 35-36 of co-pending ‘064 are especially relevant in this regard. Table 2 on page 36 of co-pending ‘064 describes different fuel additive compositions which contain the monoamine of the present claims or a diamine. For example, Comparative Example 2 includes ethylene diamine (EDA), one of the preferred amines of Worrel. Inventive Example 2 includes dimethylamine, a dialkyl monoamine that conforms to the amine recited in present Claim 93.

The effect of the amine on the performance of the fuel additive is described in the columns identified as “Valve Deposits” in Table 2 on page 36 of co-pending ‘064. Inventive Example 2 which includes a monoamine that adheres to the formula for the amine of present Claim 93 has the best performance. The ethylene diamine-containing comparative example is a composition which forms substantially greater amounts of valve deposits. Where the

amine value of the valve deposits for the comparative example is 84 mg/valve, the mean value for the valve deposits formed when a dialkyl monoamine is used is 0 mg/valve.

Applicants submit that the factual evidence in co-pending '064 is probative of the patentability of the presently claimed subject matter. Contrary to Worrel's disclosure that a diamine is a preferred amine, Applicants have shown that substantially improved performance is obtained when a monoamine is used for making a Mannich adduct-containing composition.

Applicants submit the Office's reliance on Worrel, Cherpeck and Baxter as evidence that the presently claimed invention is obvious amounts to nothing more than hindsight reasoning. Applicants submit the presently claimed invention is not obvious for the reasons discussed above, especially in view of Applicants' factual evidence rebutting the Office's assertion of obviousness, and respectfully request withdrawal of the rejection.


For the reasons discussed above in detail, Applicants request withdrawal of the rejection and the allowance of all now-pending claims.

Respectfully submitted,

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